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ABSTRACT

A series of studies evaluated methodological issues in the investigation of children's developing comprehension and production of the words "because" and "so." The familiarity of task materials and their relevance to 4-, 6-, and 8-year-old children's experience were the focus of the first study. For the second study, involving the subjects of the first experiment, a totally verbal corollary of Kun's (1968) methodology for measuring children's understanding of causality was employed. Children were told a short story about causally related events in which a cause-and-effect relationship was embedded in the context of four events. An additional focus was the comparison of psychological and physical causality. The third experiment explored the possibility that problems in 4- and 5-year-old children's performance were due to noncomprehension of the experimenter's "language game." Subjects were provided with prolonged practice and feedback in the production of "because" sentences. In an extensive fourth study, 4- through 9-year-old children's production of sentences using "because" or "so" was assessed. Subjects produced such sentences in the context of narrating events they had experienced. On the basis of the series of studies, it was concluded that tasks dramatically determined the picture of children's competence produced by researchers. (RH)

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DEVELOPING COMPREHENSION VS. PRODUCTION OF BECAUSE AND SO , Paper presented at the meeting of the Society for Research in Child Development, Detroit, Michigan, April, 1983.

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How and when do children begin both to syntactically express and comprehend the correct usage of causal connectives such as because ? Piaget (1928) and a number of other researchers (Bebout et al, 1980, Corrigan, 1975, Emerson, 1978, Johnson & Chapman, 1980, Katz & Brent, 1968, Kuhn & Phelps, 1976, Homzie & Gravitt, 1976, Bullock & Gelman, 1979) all agree that children younger than 7 or 8 years do not comprehend the meaning of because and often interpret because connectives as and or then .

In contrast to the above studies, Hood & Bloom (1979) suggest that 2 1/2 to 3 1/2 year old children can correctly produce the causal connectives because and so in natural settings. How can one account for such a difference in results? A difference of 5 to 7 years between appropriate production of sentences using a causal connective versus comprehension of such sentences seems remarkable. One alternative possibility is that the methodology of the because comprehension studies demands many other skills besides the ability to decode because , such as the memory capacity to evaluate two alternative sentences, the ability to overcome hesitance to correct sentences produced by adults, the ability to comprehend the rules of the particular language game the adult experimenter is using. The present series of studies evaluates some of these methodological issues.

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Experiment 1

The familiarity of the task materials and their relevance to the child's own experience were the focus of the first study. A number of investigators (Keasey, 1977; Labov, 1970; Peterson & McCabe, in press; and Strandberg & Griffith, cited in Cazden, 1970) have suggested that personal relevance of the stimulus materials is important in evaluating a child's linguistic competence. Prior to administration of the comprehension task, children were asked to tell narratives about their personal experiences, and the causal relationships they talked about were coded into 8 *because* sentences which served as the stimulus materials for half of this study. Each child also received 8 impersonal sentences using *because* . Half of each set (own vs. impersonal) had the appropriate order of effect-because-cause, while half were reversed to the incorrect cause-because-effect order. Random selection of sentences to be reversed and counterbalancing of order of impersonal and own sentences were employed. A puppet who was billed as making lots of silly mistakes was the ostensible producer of the sentences in order to overcome a child's possible hesitation about correcting an adult experimenter. Twenty children at each of three age ranges--4, 6, 8 years--served as subjects, with approximately half of each group being boys, half girls. Children were asked to tell the puppet when it was correct versus when it was silly. An analysis of variance was performed on the number of correctly judged minus the number of incorrectly judged sentences (a measure designed to take

account of response bias). Children performed significantly better as they got older (See Figure 1). Girls performed significantly better than boys at all ages. Contrary to our predictions, children did better on the impersonal sentences than on the sentences about their own experience. This seemingly degraded comprehension occurred despite the fact that children never made an error in their production of those personally relevant sentences. Finally, 17 4-year-olds, 11 6-year-olds, and 2 8-year-olds showed evidence of some response bias. We may not be testing comprehension of <u>because</u> so much as measuring a clear decrement in response bias with age.

<u>Experiment</u> 2

For our second study, we turned to a totally verbal corollary of Kun's (1978) methodology for measuring children's understanding of causality. She showed children a series of pictures depicting causally ordered events, and then asked children what caused event B, was it event A or event C. Virtually all children, even as young as 4 years, successfully chose event A as the cause. We told children a short story about causally-related events of the form: event A, event C (effect) because event B (cause), event D. Children were then asked to identify the cause of event C. Could the children appropriately decode <u>because</u> ? A second focus was a comparison of psychological vs. physical causality. Many researchers (Piaget, 1955, Corrigan, 1975, Johnson & Chapman, 1980, Hood & Bloom, 1979) suggest that psychological causality is most familiar to young children and hence mastered first. The

same 60 subjects served in this experiment who served in the first one. An analysis of variance was calculated on the number of correct identifications of the causal event. Again, children got better as they got older (See Figure 2). Contrary to predictions based on past research, children did better on stories involving physical causality than on those involving psychological causality among strangers. There was also a significant interaction of age and type of causality: performance on the two types of causality was most divergent at age 6; it was more similar for both 4- and 8-year-olds due to floor and possibly ceiling effects at these ages. An error analysis revealed that there is no evidence at any age that children are simply confusing because and then . Instead, the youngest children simply provide irrelevant responses, 6-year-olds admit that they "don't know" what they experimenter is looking for, while 8-year-olds understand and are good at the language game of identifying the cause in an oral sequence of events.

Experiment 3

If the major problem in the children's performance is that they do not understand the language game played by the experimenter, then it is reasonable to attempt to clarify the nature of the game--the impetus of Experiment 3. Ten 4- and 5-year-olds were first given a pretest of 12 impersonal sentences equivalent to the ones used in the first experiment to judge as silly or OK just as in the first experiment. One week later the children had six simple causal sequences enacted with dolls. A

puppet, who was still "learning how to talk right and needed help," produced a because sentence to describe the events. Appropriate feedback to the puppet (i.e., acceptability judgment of sentence) was first modeled, and then prompted from the child, and corrected if wrong. This was followed by a posttest of another 12 impersonal sentences to judge. If the children's problem in Experiment 1 was that they did not understand what they were to do, their performance should improve substantially after such prolonged practice and feedback. Each child's right minus wrong difference scores were calculated for both the pretest and the posttest, and a t-test for the difference between two related means was performed. In fact, as Figure 3 shows, there was a significant improvement from pretest (Mean=1.4) to posttest (Mean=5.4). While this experiment was not extensive enough to be considered a training study, it did clarify to the children what it was we wanted them to do, and they showed themselves capable of doing it under these circumstances.

Experiment 4

In an extensive fourth study, children's production of sentences using because or so was assessed. Ninety-six children aged 4-9 (16 children/age group) served as subjects. They produced such sentences in the context of narrating about events that really happened to them. Their sentences employing causal connectives were scored for whether they concerned psychological or physical or some other type of causality and whether they were in the correct order (temporal for so , temporally-reverse for

because). Results of this study show even the youngest 4-year-old children to be competent at production, whereas they failed at comprehension tasks performed in the laboratory. As Figure 4 shows, children almost never make errors of the type so common in laboratory studies of comprehension. That is, when they use because, they say, "I went to the doctor's because I was sick," but when they use so, they say, "She told me to count, and I thought she said pout, so I started pouting."

As far as semantic correctness is concerned, Figure 4 shows that though children are correct in this regard most of the time, they do make errors. We categorized all these errors and found that most were not errors of thought but rather were some form of sloppy linguistic usage, such as eventually naming the cause but not in a sentence adjacent to the connective (e.g., "My mom and dad think I got an allergy because we have leaves in back of the house, and I came out. I was there about ten minutes, and I came right back. And I came out and my eyes were watering and I was sniffing and everything."). We found no evidence of the magical, animistic, or artificialistic thinking described by Piaget (1930).

As Figure 5 shows, roughly 80% of all correct causal connection encodes some form of psychological causality. Notice that children here look better at psychological than physical causality, while in Experiment 2 they look better at physical than psychological. However, this reversal is deceptive. In Experiment 2, children comprehended more sentences about physical

causality than they did sentences about intentions and feelings of strangers, while in this experiment, children's correct productions were predominantly about the feelings and intentions of other people known to them. Thus the two tasks are not directly comparable in several ways.

We conclude that the relationship between comprehension and production of because and so cannot be properly evaluated until methodological problems with studies of comprehension are resolved. There is a notorious confound in studies of language development between methodology and the comprehension/production issue. That is, studies of comprehension are almost all laboratory studies, while studies of production are almost all observational. What is needed is to make such studies more comparable. Putting all four studies together, it is clear that tasks dramatically determine the picture of a child's competence that we receive.

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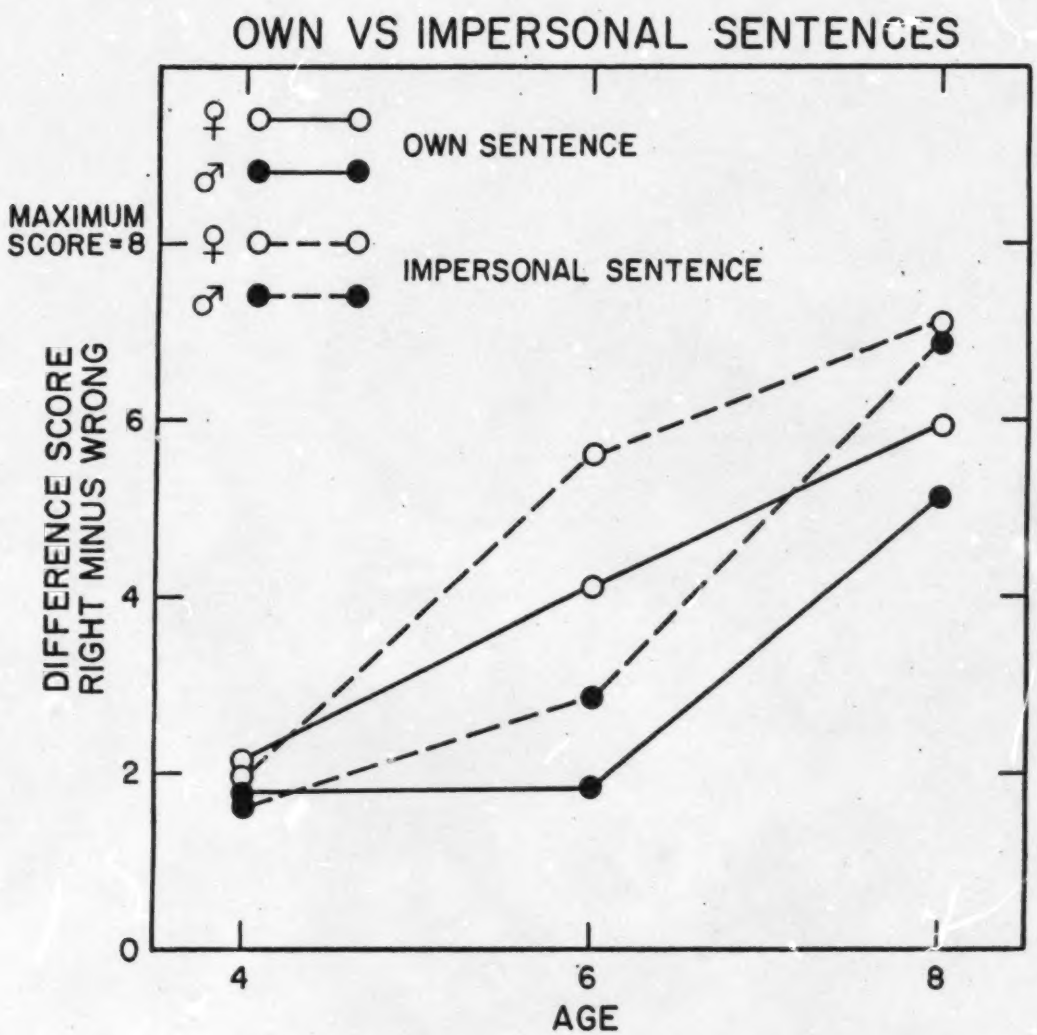
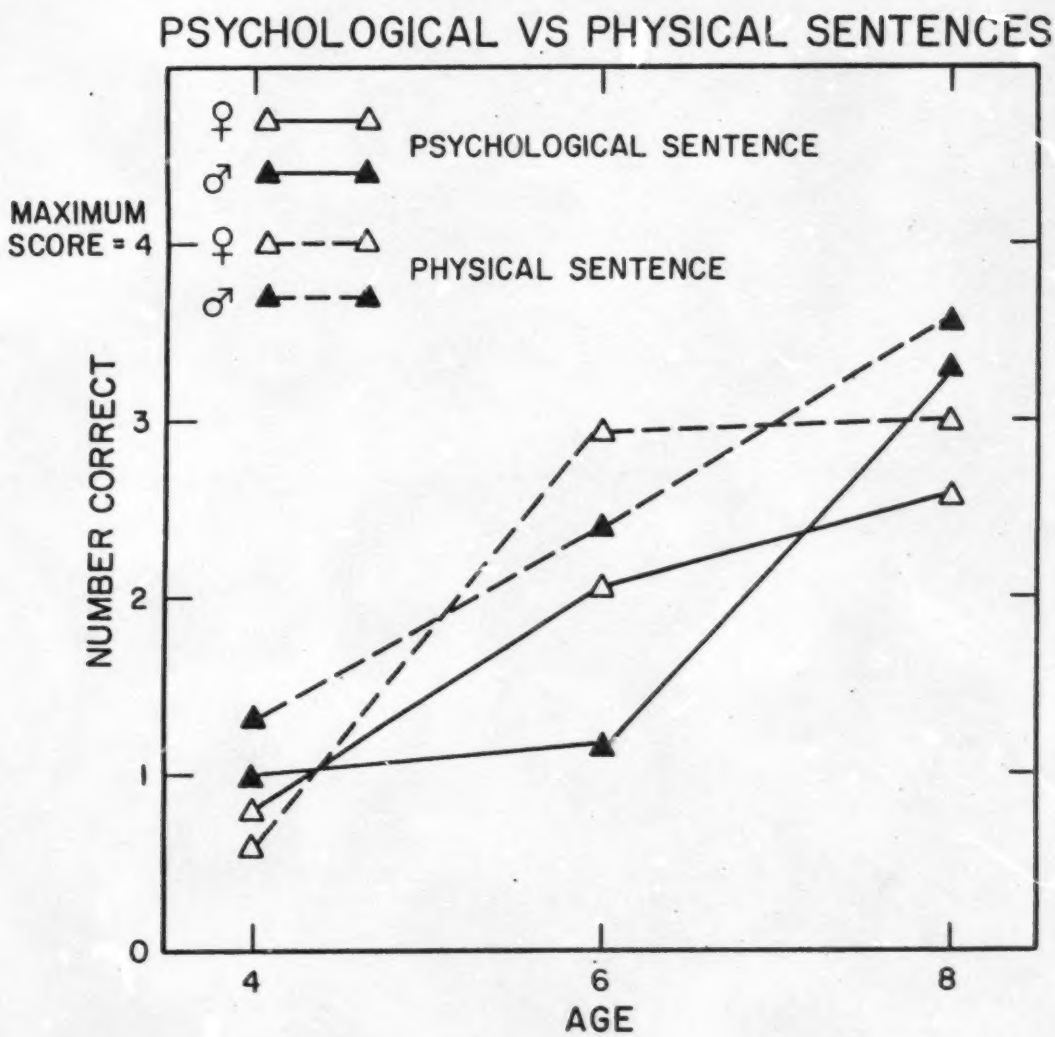
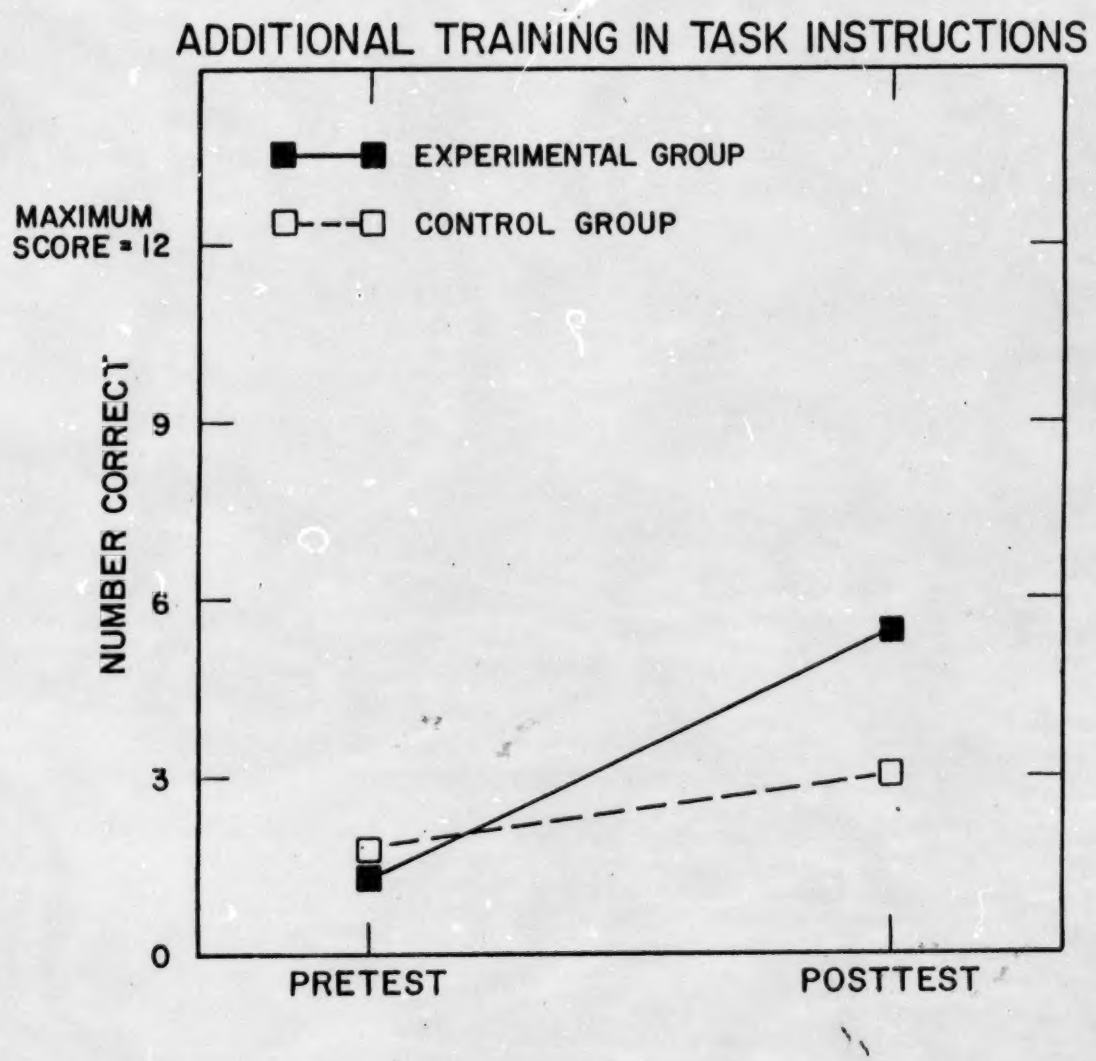
STUDY 1 --FIGURE 1

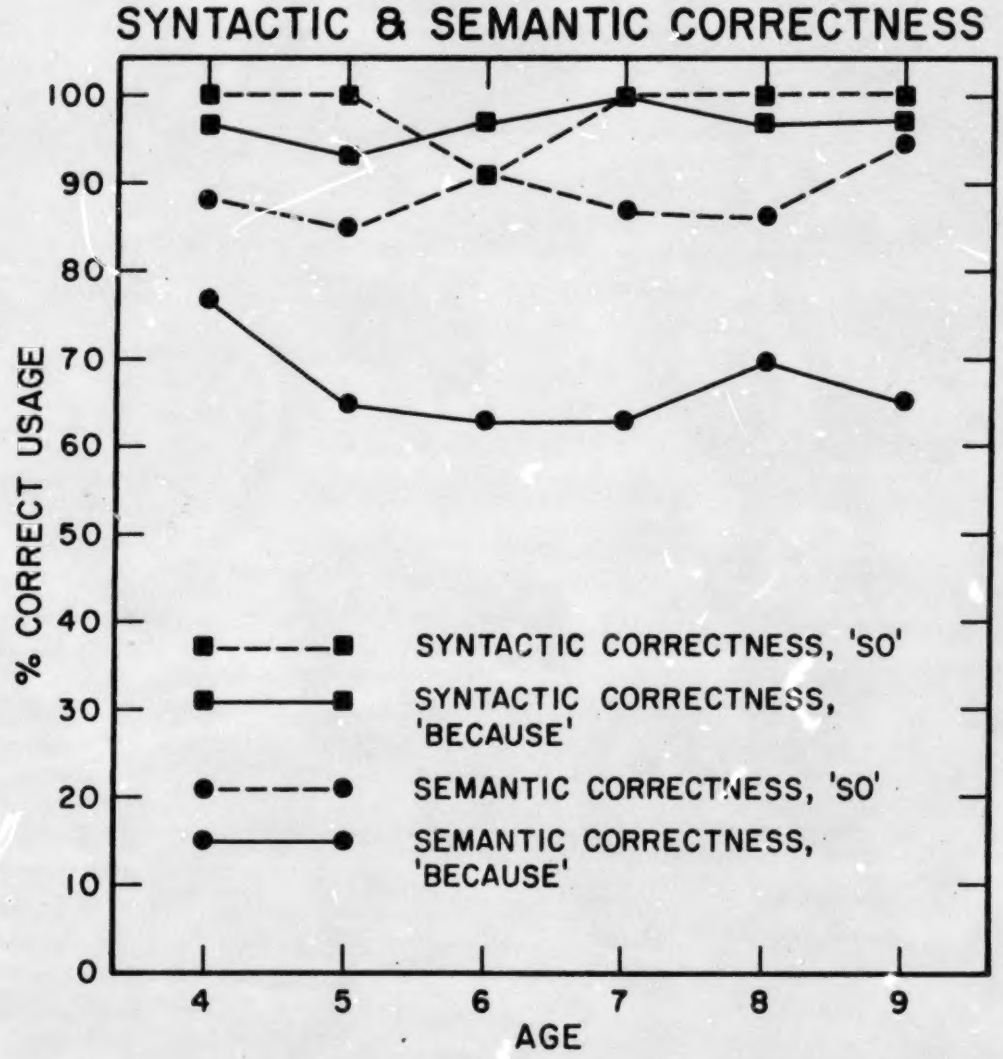


STUDY 2 -- FIGURE 2



STUDY 3 -- FIGURE 3




SYNTACTIC & SEMANTIC CORRECTNESS
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SYNTACTIC CORRECTNESS, 'SO'
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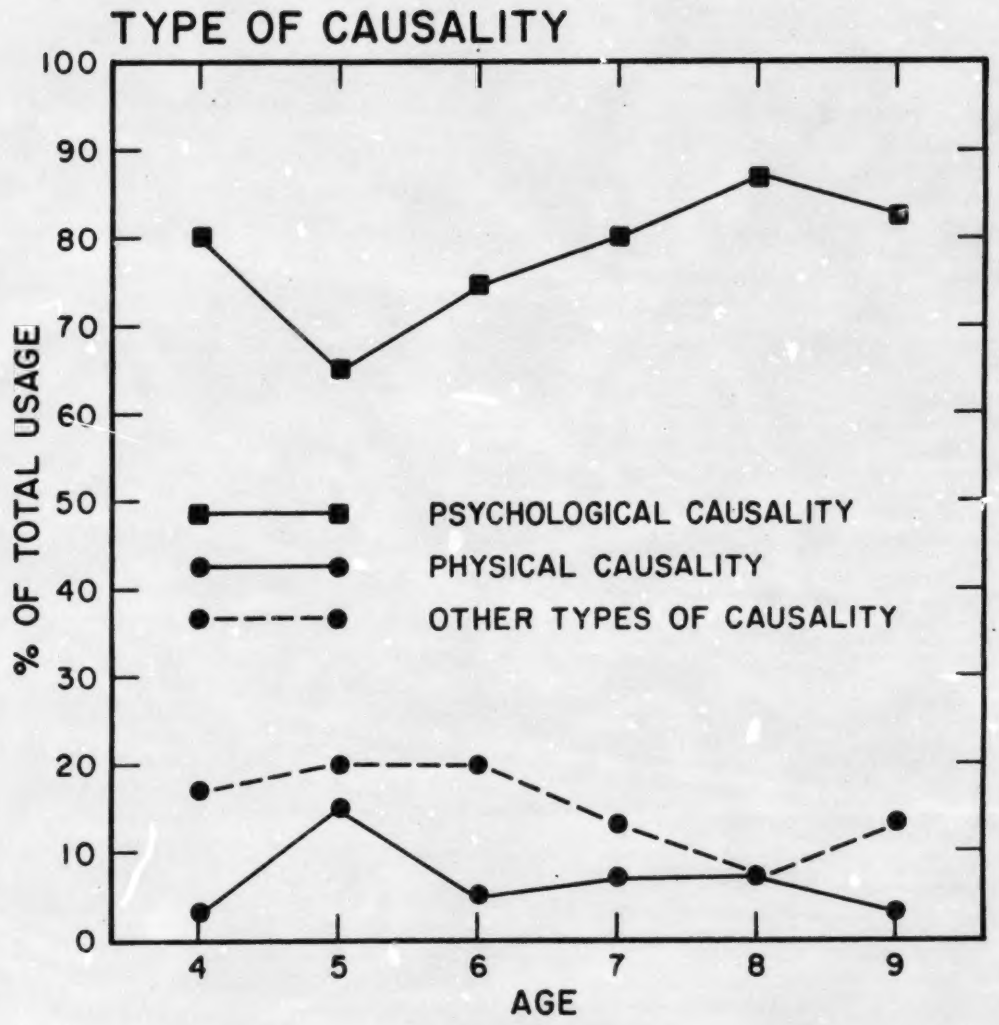
SEMANTIC CORRECTNESS, 'SO'
SEMANTIC CORRECTNESS, 'BECAUSE'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AGE
PSYCHOLOGICAL CAUSALITY
PHYSICAL CAUSALITY
OTHER TYPES OF CAUSALITY